Privacy and Security Notice

Visitor Radiological Safety Guide

Jefferson Lab Radiation Control Group

12000 Jefferson Avenue

Newport News, VA 23606

USA

(757) 269-7236

General Information

Welcome to Jefferson Lab! We hope your visit with us is both safe and enjoyable. Most of the areas you may visit while at the Thomas Jefferson National Accelerator Facility (Jefferson Lab) will not expose you to radiation above normal background levels. However, while working at or visiting Jefferson Lab you may be exposed to radiation if you enter Radiologically Controlled Areas (RCAs) or handle radioactive material.

Some of the areas where you may encounter radiation while visiting Jefferson Lab include the:

- Continuous Electron Beam Accelerator Facility (CEBAF) (various locations and buildings inside the CEBAF site fence, including the tunnel and end-stations)
- Free Electron Laser (FEL) (building 18, inside the fence)
- Test Lab- Building 58 (specific areas within the building)
- Experimental Equipment Laboratory (EEL) - Building 90 (several rooms)
- RadCon Lab (Building 52)

Briefly passing by or through these areas will not expose you to measurable radiation.

Radiological Postings

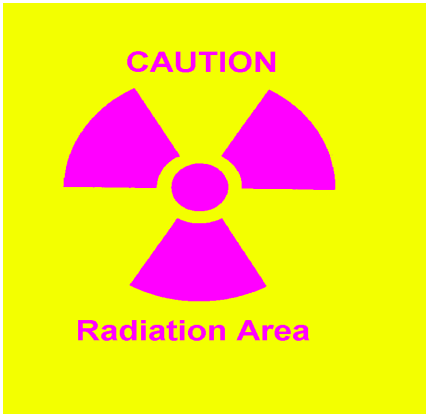
All Radiologically Controlled Areas (RCAs) and Radioactive Material Areas (RMAs) are clearly identified by various signs and labels. If there are special requirements, they will be listed on the sign. Each radiological sign will have the following characteristics:

- **The international symbol for radiation:**

- **Yellow and magenta color**
- **Special Instructions**

You may also encounter yellow and magenta rope barriers marking the boundaries of radiological areas.

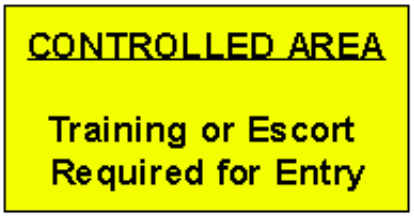
Below are some examples of radiological signs at Jefferson Lab:



Radioactive material is normally stored inside a Radiologically Controlled Area (RCA). Individual items and components within an RCA may not be labeled as radioactive, therefore it is important to consider any item in an RCA to be potentially radioactive. You should not remove anything from an RCA without permission from the Radiation Control Group. Radioactive material which is transported or stored outside an RCA is controlled through a strict inventory system and must be prominently labeled.

Requirements

If you enter the CEBAF site (past the guard house, inside the fence), you will pass a large sign reading:



At this point, you must be with your assigned escort at all times. He/she will ensure that you do not go into any areas that are hazardous, including certain Oxygen Deficiency Hazard (ODH), electrical, or Radiation Areas. Physics Users are required to pass Radiation Worker training before they are allowed on the CEBAF site.

You must also be with an escort to go into any Radiologically Controlled Areas (RCAs) not within the CEBAF site.

YOU MAY NOT ENTER THE FOLLOWING AREAS, EVEN WITH AN ESCORT:

Radiation Area, High Radiation Area, Very High Radiation Area
Contamination Area, Airborne Radioactivity Area
ODH-2, ODH-3, or ODH-5 areas
Confined Space

YOU MAY NOT HANDLE RADIOACTIVE MATERIALS OR BRING ANY RADIOACTIVE MATERIALS ONTO JEFFERSON LAB PROPERTY.

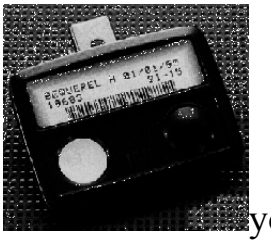
Dosimetry

A dosimeter is a device given to you to monitor the amount of radiation to which you are exposed. If you or your group are given one of the above dosimeters, you are being monitored for quality assurance purposes. The areas into which you are entering are not expected to expose you to any measurable radiation and are routinely monitored. You will not be allowed to perform radiological work while wearing only one of these dosimeters.

NOTIFY YOUR ESCORT IMMEDIATELY IF:

you drop or bump your dosimeter
your dosimeter goes off scale or appears to malfunction

Please do not press the button on the electronic dosimeter (shown on left above).

If you are given this dosimeter,  you are being monitored for an official record. You must still be escorted, but you are allowed to work in a Radiologically Controlled Area and on radioactive materials, with your escort's direct observation.

Radiation Safety Guidelines

To minimize your exposure to radiation while at Jefferson Lab, simply follow these three guidelines:

- minimize your time around radioactive materials and radiation-generating equipment
- maximize your distance from sources of radiation
- use shielding whenever possible

Your Risks

Acceptance of a risk is a highly personal matter. It requires a good deal of informed judgment. The risks associated with occupational radiation doses are considered acceptable as compared to other occupational risks by virtually all the scientific groups who have studied them. The following chart may help you put the potential risk of radiation into perspective when compared to other occupations and daily activities.

Industry Type or Activity	**Estimated Days of Life Expectancy Lost***
Smoking 20 cigarettes a day	2370 (6.5 years)
Overweight by 20%	985 (2.7 years)
Mining and Quarrying	328
Construction	302
Agriculture	277
Government	55
Manufacturing	43
Radiation - 340 mrem/yr for 30 years	49

Radiation - 100 mrem/yr for 70 years	34

*Note: The "life expectancy lost" value is determined from data on percentage of deaths due to the risk factor weighted by the average age at death. Since radiation related deaths are calculated values, they are based on the assumption of cancer as the cause of death, with the associated average age of death from cancer victims. All radiation risk values are based on the latest report from the National Academy of Sciences' Biological Effects of Ionizing Radiation (BEIR) series - BEIR V.

The table below presents another way of looking at health risks. This table lists activities calculated to have a one-in-a-million chance of causing death.

- Smoking 1.4 cigarettes (lung cancer)
- Radiation dose of 10 mrem (cancer)
- Eating 40 tablespoons of peanut butter (liver cancer)
- Eating 100 charcoal broiled steaks (cancer)
- Spending 2 days in New York City (air pollution)
- Driving 40 miles in a car (accident)
- Flying 2,500 miles in a jet (accident)
- Canoeing for 6 minutes (accident)

There is a 20% risk of getting cancer just from living. If you receive 4 mSv/y (400 mrem/yr) for 30 years, your calculated cancer risk may go from 20% to 20.5% . For comparison, smokers' cancer risk goes from 20% to 25%. It should be noted that theses are calculated values, but it is strongly believed that there is about a 100 mSv (10,000 mrem) threshold for any cancer induction from radiation exposure.

Fetal Exposure

Since an embryo/fetus is especially sensitive to radiation (embryo/fetus cells are rapidly dividing), special considerations are given to pregnant workers. Protection of the embryo/fetus is important because the embryo/fetus is considered to be at the most radiosensitive stage of human development, particularly in the first 20 weeks of pregnancy.

Limits are established to protect the embryo/fetus from any potential effects which may occur from a significant amount of radiation. This radiation exposure may be the result of exposure to external sources of radiation or internal sources of radioactive material.

Potential effects associated with prenatal radiation doses include:

- Growth retardation
- Small head/brain size
- Mental retardation
- Childhood cancer

At present occupation dose limits, the actual probability of any of these effects occurring in the embryo/fetus from occupational exposure of the mother is small. As a visitor, the probability is infinitesimally small. There are no known heritable effects - i.e., occupationally exposed personnel have no known increase in birth defect rates.

Safety/Emergency Information

You have a right to know about all the hazards you may encounter while at Jefferson Lab. If you have further questions about the following subjects, please call the appropriate number listed below.

Radiation Safety

Radiological Records	(757) 269-7236
Operational Health Physics	(757) 269-7551

ODH/Cryogenics Safety

Claus Rode	(757) 269-7511

Electrical Safety/Accelerator Site Safety

Eric Hanson	(757) 269-6253

Chemical/Laser/Hazardous Material Safety

Patty Hunt	(757) 269-7039

Emergency Phone Number (from any Jefferson Lab Phone): 4444

ODH Briefing

Some areas that you may enter are classified as ODH, or Oxygen Deficiency Hazards. They may contain cryogens, or liquified gases, that expand greatly when they turn into gas. These cryogens can replace all the local oxygen if this happens. Although the probability of death due to this happening is very small (<1 in 10,000,000 per hour), you need to know the following danger signs:

- a blue strobe,
- a loud buzzing alarm, or
- a white plume.

If any of these occur, quickly leave the area **with** your escort, making sure not to pass through any plume. If your escort is lost or unconscious, go out through the nearest exit, making sure not to pass through any plume - do not try to remove any unconscious person from the area. Go to the nearest phone and dial **4444**.

You may not enter ODH-2, ODH-3, or ODH-4 areas, even with an escort.